

July 27, 1959

Aviation Week

Including Space Technology

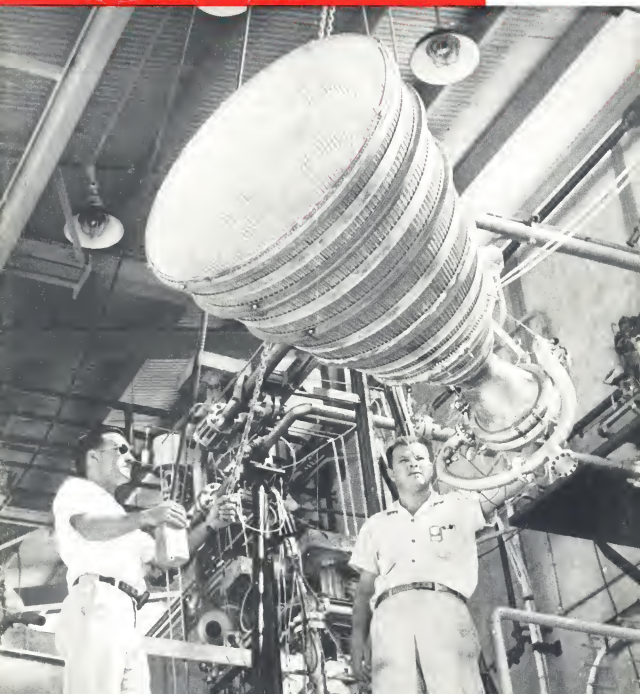
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SPECIAL REPORTS:

- AO-1 Design
- Maxson Radar

Pratt & Whitney Centaur
Liquid Hydrogen Engine



The B-88, America's first supersonic bomber, is a product of Convair and more than 4,000 participating suppliers and subcontractors located in every part of the nation. They do not include the tens of thousands of companies who receive business from Convair's direct suppliers. At Convair, Fort Worth under the Weapon Systems Management contract, two out of every three dollars spent for the U.S. Air Force on the B-88 are paid to these supporting businesses for material and labor. In fact, the American war, Convair, a Division of General Dynamics Corporation, has taken leadership for maximum contribution, for security, and for peace.



BEING INTEGRATED INTO TOMORROW'S AIRCRAFT AND MISSILE SYSTEMS

Variable Displacement Hydraulic Pumps with MAXIMUM HP/LB RATIO

Model Series	Employment in 1970	B7E		Weight in	B7C/LB	
		Unfilled Lbs	Loaded		Unfilled Lbs	Loaded
PM06	085	13,200	12,500	2.8	4.55	3.12
PV012	188	14,500	30,000	4.5	4.45	3.04
PW24	267	21,800	8,000	6.5	4.53	3.13
PW08	608	10,000	8,000	30.2	4.33	3.45
PM082	950	8,900	7,000	14.0	4.44	3.49
PM134	1,880	7,500	5,800	19.0	4.65	3.58
PM163	2,580	6,500	5,100	26.0	4.60	3.60

*This is broader about harmonization of 2000 and

The above table is important to anyone concerned with the selection of hydraulic pumps for future air or space vehicles. Note particularly the horsepower-to-weight ratios for both rated and limited life speeds. These are the highest known available at the time.

But highest hp/lb only one of many advantages offered you by the new Vickers advanced design variable displacement pumps. Developed to meet the requirements of the new MIL-T-15672 specification, this new series has volumetric efficiencies of 96% to 98% over a pressure range of 200 to 3000 psi. . . and has 4000 psi continuous operation capabilities. These pumps have faster response and improved contamination resistance. They are practically the same envelope as constant displacement units of equal output. The first five dies are now being integrated into advanced aircraft and missile systems; the two larger sizes are in the development stage. Write for Bulletin A-5023 for additional information.

VICKERS INCORPORATED

SYSTEM OF INTER-AREA COORDINATION

Acme Hydraulic Division - Engineering, Sales and Service Offices
ADMINISTRATIVE and ENGINEERING CENTER—Department 1402 • Route 33 • Michigan
VERBANC, CALIFORNIA—2281 Leslie Blvd., P.O. Box 2020 • Torrance, Calif.

Acute Hydrolytic Renal Failure: Clinical Signs and Service Office

[illegible]

Variable Hydraulic Motion using the Advanced Design System (ANSYS) is now under development.



What you should know about

KENNEDY FIELD ENGINEERING SERVICE



Over the years Kennedy has expanded its facilities to meet the needs of the aviation industry... and today provides a complete field engineering service geared to solve the complex problems of aerospace system installation. This service, conducted by thoroughly experienced Kennedy field engineers and technicians, includes site selection, assembly, erection, trouble shooting and checkout, customer training, and on-site job training for system personnel in operation and maintenance. An important fact is underlined here: that Kennedy capability in aerospace systems is total capability.



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Domestic SOLUTIONS to non-Dr. unit PROBLEMS
Tracking, Antenna-Radar, Telemetry-Radar, Antennas
"Time-Share" Antennas-Telemetry-Radar
Communications

AVIATION CALENDAR

- Aug. 25-Sixth Annual Western Regional Meeting, American Astronautical Society, Ambassador Hotel, Los Angeles, Calif.
- Aug. 27-Willard Product, Design Conference on the problems of hypersonic and space flight. Washed the North, Washed, Calif.
- Aug. 31-Third National Heat Transfer Conference & Exhibit, University of Connecticut, Storrs, Conn. Session Areas: on Society of Mechanical Engineers, American Institute of Chemical Engineers.
- Aug. 18-19-Wright Air Development Center Symposium on Aircraft Structural Design, Dayton, Ohio (Aircraft Structural Design, Dayton, Ohio).
- Aug. 18-19-Eighth Annual Conference on Applications of X-Ray Analysis, Boulder, Colo. (X-Ray Analysis, Boulder, Colo.).
- Aug. 15-First National Ultrasonic Symposium, Institute of Radio Engineers, Pro (Institute of Radio Engineers, Pro).
- Aug. 15-16-Western Electronic Show & Convention, Institute of Radio Engineers, San Francisco, San Francisco, Calif.
- Aug. 21-Durham-Robertson Engineering Club's 5th Annual, Boston, Mass., La. Program includes the West, and includes displays both flying and static.
- Aug. 24-25-California Dynamics Symposium, American Rocket Society, Northbrook, Illinois, Northbrook, Ill.
- Aug. 24-25-Institute of the Aerospace Sciences' National Symposium Meeting, a symposium on subsonic aerodynamics, (Institute of the Aerospace Sciences, San Diego, Calif.).
- Aug. 24-25-Fourth Symposium on Helicopter Design and Space Technology, Los Angeles, Calif. (Symposium on Helicopter Design and Space Technology, Los Angeles, Calif.).

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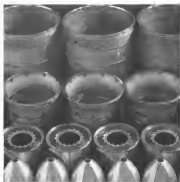
AVIATION WEEK including Space Technology

July 27, 1959
Vol. 21, No. 4

Special report with an additional section on the...
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Information, field measurements and design of...
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AVIATION WEEK, July 27, 1959



high temperature

AVIATION
COMPONENTS
BY LAVELLE

Lavelle manufactures aviation components to meet the most critical demands of high temperature operation. Typical of the many high temperature parts produced in quantity by experienced Lavelle craftsmen are the jet engine tail pipes, engine casings and heat exchangers shown above.

Lavelle specializes in the production of precision sheet metal weldments and assemblies made of titanium, aluminum, stainless steel, and heat-resistant nickel alloys... joined by welding methods applicable to specific component design and function. Where required, special tools are designed and fabricated by Lavelle to maintain production quality, reduce cost... and promote on-schedule delivery.

If your requirements for component performance demand the very highest standards of component workmanship, call on Lavelle... or write for brochure describing specialized skills and facilities ready to serve your needs.



LAVELLE AIRCRAFT CORPORATION • NEWTOWN, BUCKS COUNTY, PA.
Between Philadelphia, Pa., and Trenton, N.J.

HIGH TEMPERATURES and **CORROSIVE FLUIDS**



Now, Trans-Sonics' Pressure Potentiometers, Type P103, measure pressures of corrosive fluids such as red fuming nitric acid (RFNA) and symmetrical dimethylhydrazine (UDMH) for telemetry and control applications at ambient temperatures up to 600F.

Corrosive fluids are contained by a welded Inconel-X bellows which actuates a dynamically balanced mechanism. This mechanism is hermetically sealed in a stainless steel case for protection against corrosion and other environmental hazards.

Accuracy and reliable performance has been proven under the following conditions typical of missile environments: Random Gaussian Vibration 0.1g / cps, 15 to 2,000 cps; Acceleration 75g; Shock 75g.

Flexibility of installation is assured by small size and light weight. Dimensions are 1 1/2" diameter by 1 3/4" long. Weight is only 6 ounces. Standard ranges are 0-500 and 0-150 psia; other ranges to special order. Write for Technical Bulletin P103 to Trans-Sonics, Inc., Dept. 7, Burlington, Mass.

TRANS-SONICS

Precision Transducers



AVIATION CALENDAR

(Continued from page 5)

- Aug. 27-28-International Commemorative Spaceflight Symposium, Church House Westminster, London, England
- Aug. 31-Sep. 3-Second Army Navy Space Institute, Project (ANSP) Symposium and Industry Briefing, Dwight D. Eisenhower Hall, Dallas, Tex.
- Aug. 31-Sep. 5-19th Annual Congress, International Astronautical Federation, Church House Westminster, London
- Sept. 1-3-Casimir on physical sciences in aerodynamics and space flight, the results of French-Soviet Polakowski, Ts. Spetsnaz, Air Force Office of Scientific Research and General Electric Co.'s Mark and Space Vehicle Dept.
- Sept. 2-4-1977 Cosmoquest Symposium Cosmology, University of California, Santa Barbara, Calif.
- Sept. 3-6-National Corrosion and Aerospace Symposium, Air Force Vets, Edwards Air Force Base, Santa Fe, N.M.
- Sept. 7, 10-1977 Eurospace '77, Hong Kong Display and Exhibition, Society of British Aircraft Constructors, Farnborough, Eng.
- Sept. 9-10-Soviet Union Conference on Fluid and Solid Mechanics, University of Texas, Austin, Tex. Sponsored by USSR Academy of Sciences, Soviet Union
- Sept. 10-17-Vietnam Regional Meeting on Telemetry on Science and Engineering, Institute of Geodesy and Surveying, Los Angeles, Calif.
- Sept. 19-25-19th Annual Conference and Exhibit, International Society of Space Engineers, Amphitheat, Chicago, Ill.
- Sept. 21-22-English Annual Meeting, Space Engineering Society, on Telemetry in Service of Space, Hartford, Conn.
- Sept. 23-24-Engines and Operations Symposium, Aeronautics, Melbourne, N.Z.
- Sept. 25-26-1977 National Symposium on Chemistry, Corp. Astronautics and Aeronautics, Los Angeles, Calif. Sponsored by Institute of Radio Engineers, Astronautical Group, on Space, Philadelphia, Pa.
- Sept. 30-Oct. 2-13th Annual Meeting, Spacecraft, Airport, Monterey, Calif. Sponsored by The Hotel, Berkeley, N.C.
- Oct. 1-7-1977 Anglo-American International Conference, Institute of the Astronautical Sciences, State Univ. New York, N.Y.
- Oct. 5-10-National Astronautical Meeting, Society of Astronautics, Progress, B. Astronautics, Los Angeles, Calif.
- Oct. 6-10-19th Annual Meeting, National Astronautical Society, Hotel Leaning Tower, Minneapolis, Minn.
- Oct. 6-9-to National Symposium on High Temperature Technology, Anaheim, Calif. Sponsored by General Motors, Pasadena, Calif. Sponsored by Stanford Research Institute.
- Oct. 8-Symposium on Engineering, Iron Works, Symposium on Solid State in Space, Iron Works, Pasadena, Calif. Sponsored by Iron Works, Pasadena, Calif.
- Oct. 12-14-19th National Electronics Conference, Hotel Sheraton, Chicago, Ill.
- Oct. 12-16-19th General Conference of the International Air Transport Association, Tokyo, Japan

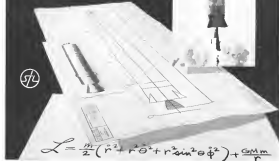
Sometimes forgotten during the thundering aspect of a space probe rocket are months of meticulous analysis, engineering and planning. The staff of Space Technology Laboratories is now engaged in a broad program of space research for the Air Force, the National Aeronautics and Space Administration, and the Advanced Research Projects Agency under the direction of the Air Force Ballistic Missile Division. For space probe projects STL provides the total concept approach, including preliminary analysis, sub-system development, design, fabrication, testing, launch operations and data evaluation. The total task requires subtle original analysis in many fields as well as sound technical management.

The STL technical staff brings to this space research the talents which have provided system engineering and technical direction since 1954 to the Air Force Ballistic Missile Program. Major missile systems currently in this program are Atlas, Titan, Thor and Minuteman.

The scope of STL's responsibilities offers creative engineers, physicists and mathematicians unusual opportunities to use their ideas tested in working hardware. Inquiries are invited regarding staff openings in the areas of Advanced Systems Analysis, Rocket Propulsion, Space Flight Mechanics, Dynamics, Structural Analysis, and Aerodynamics.

Space Technology Laboratories, Inc.

P. O. Box 35904, Los Angeles 45, California



DAWN OF A NEW DAY IN EXECUTIVE FLIGHT



Lockheed JetStar power pod installation by Rohr



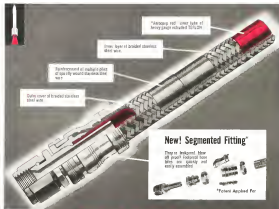
ROHR
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World's Largest Producer
of Components for Flight

Rohr knowledge and know-how are being built into complete, ready-to-install jet pods for the new Lockheed JetStar—one of the best of a new series of fast, compact jet executive aircraft.

Equipped with extensive experience and very special machines and facilities, Rohr is responsible for the engineering and manufacture of these complex power pod installations.

HEADQUARTERS: 2001 YEAZIE, CALIFORNIA PLANT #2: HUNTSVILLE, ALABAMA ADDITIONAL PLANTS: WHEELING, OHIO WASHINGTON, D.C.



BURST PRESSURE
24,000 psi.!
OPERATING PRESSURE: 6000 psi.

AEROQUIP ANNOUNCES VERY HIGH PRESSURE 678 PNEUMATIC HOSE LINES OF Teflon

Aeroquip makes a major contribution to safety in the handling of very high pressure air, helium, nitrogen and other gases for mobile charging centers. Newly developed and now available is rugged 678 Hose of Teflon, rated for 6000 psi service — with a 24,000 psi burst.

With an inner tube of Teflon, which has zero moisture absorption and an oil release surface, Aeroquip 678 Hose allows fast, easy purging and dislodgment. The hose has superior resistance to abrasion, low relaxing expansion and high temperature resistance. Before the engine for complete information.

Aeroquip 678 Pneumatic Hose of Teflon			
Hose part number	678 B	678 R	
Hose size I.D.	3/16	1/4	
Hose size O.D.	600	612	
Oper. press., psi	6,000	6,000	
Burst press., psi	24,000	24,000	
Burst radius of pressure	8	10	

AT 678 Hose is in stock at

Aeroquip

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Title _____
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City _____ State _____

NEWS IS HAPPENING AT NORTHROP



Radioplane dromes (from left to right): RP-16, RP-76, RP-77, RP-78, RP-79, RP-80, RP-81

RADIOPLANE CREATES FIRST FAMILY OF UNMANNED AIRCRAFT TO TRAIN

Radioplane is the world's leading producer of drones and space age recovery systems. As live targets, drones perform as aircraft—then can be recovered by parachute. As evaluators, drones simulate the appearance of the enemy threat while they score our weapon systems' effectiveness. On surveillance missions, drones are zero-length launched, fly cameras, take photos, and return with information within minutes.

Typical of the high-performance Radioplane target is the RP-76. This smaller target jet first seen by missilemen is rocket powered, and it has the radar appearance of a large aircraft.



MEN, EVALUATE WEAPON SYSTEMS, AND SURVEY ENEMY TERRITORY!

United States Army requirements for a surface-to-air missile target called for Mach 0.5 to 0.9 performance at 40,000 feet altitude. After air launch, the proposed target missile was to have a powered flight duration of eight to nine minutes. Under the direction of U.S. Army Ordnance, Radioplane produced the RP-76 target missile which has met or exceeded all of the performance specifications. Performance

of the complete RP-76 system, including flight operations, is particularly impressive in view of the anticipated low production and operational cost.

Radioplane's leadership in the field typifies the years-ahead thinking that continues to produce design concepts for tomorrow, hardware for today—developed, produced, and delivered on time—at minimum cost to the taxpayer.

RADIOPLANE

San Diego • Cincinnati • Los Angeles • Texas



A
Division of
NORTHROP
CORPORATION



whatever your precision-positioning problems...

WESTERN GEAR CAN SUPPLY THE SOLUTIONS



To insure the reliability of the missile, its positioning must be accurately and consistently handled. No matter what mode of transportation, track, rail, air or water, there are Western Gear precision drives and related equipment engaged in the tough and delicate task of handling the mighty "birds." Moreover, Western Gear's extensive experience and facilities enable the company to effectively handle your system requirements.

For complete information on our capabilities and facilities, write on your letterhead for Bulletin 9900.

WESTERN GEAR CORPORATION
Precision Products Division, P.O. Box 282, Lynwood, California



Sharp new eye for navigation

SHARPER new "eye" for flight is the Ryan C W Doppler navigator. Based on the advanced doctrine of continuous-wave radar, this system of electronic "intelligence" has been pioneered by Ryan and the U.S. Navy for navigation at all speeds. It tells pilots how to fly in any spot on the globe with speed and precision, and how time hours easily when they are at all times.

With the Ryan navigator, military aircraft and private craft fly a new "electronic skyway" which provides precise separation between planes and does errors done and fail. And because RYANAV systems work right down to ground and sea levels, these instruments operate at take-off, climb-out, descent and landings, as well as enroute.

The Navy has selected RYANAV for installation in its major types of naval aircraft. They are already in operation use in the Navy's first all-weather anti-submarine helicopters and are being installed in Army aircraft and helicopters, for low level "map of the earth" operations.

Reasons for such wide and versatile use are found in the unique features of RYANAV systems. They are the lightest, simplest, most reliable, most consistent of their type. They are setting new standards of economy, freedom from adjustment, and ease of maintenance, opening new areas of navigational freedom, and operational applications. Ryan dispatches engineering assistance is available upon request to those who wish to explore these areas.

Ryan's rapid growth in electronics is creating new opportunities for engineers and technicians.

RYAN BUILDS BETTER

ELECTRONIC EQUIPMENT

Ryan Aeronautical Company, San Diego, Calif.

NOW..

HIGH PRESSURE HOSE FOR AIRCRAFT AND MISSILES

STRATOFLEX

SUPER "T-HP"

Teflon[®]*

HOSE

with
medium pressure
"SUPER-T"
RELIABILITY

Withstands tests more severe than MIL-H-8788

- High Temperature Spectrum tests exceed MIL-H-8788 in both impulse and temperature requirements and fully qualified to ARP 604.
- Positive lock fitting through elimination of sealant band.
- Available with swivel elbows that can be rotated without disturbing the wire grip lock.
- Stratoflex High Pressure Fitting combines the exclusive Precision Advantek Global Seal and the assurance of crimp design.
- Shelf life positively unlimited.
- Available in two styles of high temperature fittings. Combination of stainless steel and carbon steel, or corrosion resistant all stainless steel fittings.

These assemblies are factory assembled from stock with straight, 45° and 90° fittings. Other angles or connectors are made in your specifications. WRITE FOR BULLETIN S-7 TODAY!

*Teflon is a registered trademark.

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Cable assemblies by BENDIX

Specialized designs for the most exacting requirements

The versatility of design and reliability of performance offered by Bendix® Cable Assemblies result from over a quarter century of precision manufacturing in this field. Our outstanding research and design facilities are available

for custom designing cable assemblies to meet your specialized requirements on each installation. Cable assemblies shown are typical Scintilla Division developments in coding for aircraft, electronic and space applications.

Circle 11 on Reader Service



NOISE CONTROL CABLE: This cable is fabricated using both Bussell® (in outer jacket covering) and Bendix stainless steel conductors. Provides high capacity conducting the firing of missiles.



TEMPERATURE RANGES: Flexible, completely sealed and suitable for extreme operation in addition to temperatures of -40°F to 1500°F. Temperatures are easily adjustable and the sealed flexible elements are capable of meeting these ultimate, consistent or other requirements.



CONTROL WIRE: This configuration encased and sealed in metal braid and coupling with padding has fully satisfied the extreme effects of nuclear environment work at heat, vibration, and shock.



FOR THIS CASE: Cable replaces electrolytic so fast count inputs, point-to-point and plug-in device mounted modules that will. Features: volume reduction and better type control; double layer protection; smooth curved carrying conductors; available and integral connector shells.



HEAT SHIELD CABLE: Ground support cable assembly built and designed for hard usage in missile launching systems. Heavy duty shielding and a tough resistant tubing conduct to shock waves.



WIRE CORD: Ribbon type cable terminated in both standard MIL or Bendix Type® connectors. Advantages offered by this type of wiring include: durability, performance improvement, plus minimum space requirements.

Scintilla Division, Bendix Corporation, 3015 17th St., New York 17, NY. Canadian Sales: Scintilla Canada Ltd., 2000 Woodbine Blvd., Richmond, Ontario.

SCINTILLA DIVISION
BENDIX, NEW YORK





REQUIRED: A lightweight, low-loss, radiation-free cable with electrical uniformity for interconnecting the navigation and communication antenna circuits of the Douglas Aircraft Co.'s new DC-8 jet airliner.

SPECIFIED: *Foamflex® Coaxial Cable*



A semi-flexible cable with tubular copper inner conductor, foamed polyethylene dielectric and commercially pure aluminum outer conductor.

With outstanding advantages for use in aircraft navigation, communication and warning circuits that include:

1. Twice the efficiency of solid dielectric (RG-8¹/₂) type of cable now in general use.
2. Extended life characteristics that permit permanent installation and assure electrical stability during the life of the plane.
3. Good frequency response over wide temperature variations; capable of withstanding highest summer ground temperatures, as well as extremely low temperatures found at high altitudes.
4. Greater efficiency and improved system performance without the use of additional electronic components.
5. Ability to operate in both pressurized and non-pressurized parts of a plane without the use of cable dehydrators or pressurizing systems.
6. Lighter and smaller than many cables now installed in aircraft.

Foamflex coaxial cable is supplied in long lengths on lightweight, disposable reels. For further information or inquiries, write Dept. FC.



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Wanted!

Aircraft Radio Range Receiver VINTAGE OF 1928



The old P-1000 "Hawking" was equipped with the "Model B" radio range receiver.

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The instrument sought was known as the "Model B", designed in 1927 and sold by the company as early as 1930.

The equipment was used in the old P-1000 "Hawking" model aircraft, used by N.A.E., which later became United Air Lines. It was also modified between Boston and New York. In 1929 it served Admiral Byrd's first expedition to the South Pole in 1929.

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Possibilities for Green Energy 27

COVER: First part of front chamber for ERI's Super hydrogen engine (the 110000). **Inset Photo:** Daniel & William NER 1115. Inset at lower middle: our stand at F&M's Florida Research and Development Center. Chambers have been firing since each spring. Two qualified NER 1115 will power Ceres. Ceres will stage for Air Force, National Aeronautics and Space Administration and Advanced Research Projects Agency missions. High expansion ratio (approximately 40) is made a signal of high altitude engine. Slipping shell of cast aluminum fits in allowing rapid rate of delivery. Jet is pure liquid hydrogen spalls and boils off. For other pictures and details, see p. 23.

[illegible]

37,543 copies of the virus injected

Possibilities for Gross Error

amount and his standards of disaster are far different from those in this country. Mr. Khrushchev is reported to have told Soviet Premier Khrushchev recently that he was prepared to exchange with the West and indicated he thought that would be the extent of the Soviet damage. If that is true, somebody had better get across to Mr. Khrushchev, a more realistic appraisal of the current SAC nuclear defense capability.

Here are some of the misconceptions that appear to exist in Russia as a result of their rigid control and official distortion of information from the Western world:

- The heated and often unproductive debate over our defense program is interpreted in Russia as an argument over whether or not we want a defense program or not. They apparently do not realize that the country is frankly united on this point and the debate concerns only the pace and scope of the defense program. They overlook the fact that it is now pouring about \$40 billion a year into defense and the debate concerns only whether we should add five or ten to that total.

- They appear to believe that the business and financial community in the Achilles Heel of the U.S. defense position and that the two firms of lowered taxes due to a massive reduction in their corporate expenditures and big profits from trade with the Soviet bloc will prove irresistible to U.S. business and finance.

- They have underestimated the immeasurable political, executive and administrative lagging in our defense program as a lack of genuine technical and industrial ability in the critical new fields of weapons technology such as missiles and space. As a result, they tend to overestimate the magnitude and possible duration of their superior lead in certain phases of these fields.

- The tremendous potential of their genuine scientific successes and the suppression of all failures record against our policy of discussing success and failure with almost equal modesty tends to give the Soviet critics and officials—outside the technical circles who know better—a violently distorted picture of their nation's capability relative to the rest of the world. Very little touches the Soviet critics about the genuine progress in weapons technology achieved in this country.

- Because we often fail to back our "no retreat" implied policy statements with what would be interpreted in Russia as effective military preparations, the Soviets believe we don't mean what we say, and are easily persuaded to retreat or compromise. The Soviet's public claim of "no retreat" if their preparation was made would be a small price to pay for their actual effect on Soviet policy making.

There is no doubt that the Soviet military position has improved substantially in the past few years and the ever-much-needed Western amount of assistance has diminished. There also is a great danger that if we fail to accelerate and equalize our weapons development programs into the new technologies we will face a position of critical inferiority as the future.

But the greatest danger today and for the immediate future is the possibility of war based on a major miscalculation by the Soviet leaders of our military capability and our determination to act on it when necessary.

—Robert Hottel

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NEW ELECTRICAL PROPELLER DE-ICER FOR LIGHT TWINS



A new B.F. Goodrich Electrical Propeller De-Icer system will soon be available for the Aero Commander, Cessna 440 Piper Apache, and Beechcraft D4E 18 Twin Bonanza and Model 95. FAA certification is now pending.

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BFG Electrical De-Icer eliminates radio, liquid valves, sensors etc., required for standard de-icing systems. Weight is cut to a minimum—only 8 to 10 pounds, depending on the make and model of aircraft. The system is always ready—no non-freeze fluid to replenish or run low. Electrical operation and precisely programmed power provide maximum ice protection.

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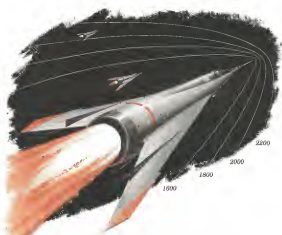
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Washington Roundup

Keirn Boasts Nuclear Plane

U.S. could get a nuclear-powered jet aircraft into the air in less than a year, says Gen. Donald J. Keirn, chief of the Air Force-AEC nuclear aircraft program, and his work is the strongest statement thus far in support of the "dash" development concept for the atomic plane.

Keirn's position laid out in testimony at hearings of a subcommittee of the Joint Congressional Committee on Atomic Energy, is in direct contrast to the Administration's "go-slow" policy of flying a nuclear aircraft only after its systems exceed the performance of domestic jetted targets selected by Dr. James Killian, who is now assigned as the President's scientific adviser. Major points made by Gen. Keirn include:

- Main objective of the Air Force is to develop a direct rock nuclear propulsion system similar to the one now developed by General Electric Co. Keirn's office does not want to wait for the "mishmish" of "full performance tests" and believes a long testbed using the existing jet-rock turbo-propulsion core will expedite development of a nuclear weapon system.

- Preliminary design studies of direct rock nuclear propulsion, under development by Pratt & Whitney Division of United Aircraft Corp. and now under Navy sponsorship, have shown that there is a possibility of achieving the necessary thrust-to-weight ratio for high altitude, supersonic speed flight on nuclear power alone. The engine is well advanced in the direct cycle stage, and no time schedule can be attached to its development. It is considered promising because, for the construction of a nuclear-powered aircraft of the B-70 type.

- Agreement was reached in 1955 between Keirn and Adm. James S. Russell, then chief of the Bureau of Aeronautics, that Navy participation in the nuclear aircraft program would not "open the door to competition" to it. The Navy requirements for an atmospheric aircraft, he said, is less than 10 percent through the use of the indirect cycle engine and a jet-type duct which is heavier than that required by the Air Force but pays for all of the aircraft's equipment and personnel for refueling.

- At Navy procedure for establishing weapons and equipment requirements has changed during the last six months. Previously the nuclear-powered strategic system was preferred under General Operational Requirement No. 51.

The program is now this requirement was dropped, leaving WS-13A. Now the planning volume of the Air Force, one in the process of replacing General Operational Requirements with either Specific Operational Requirements or System Development Requirements. The specific requirements are reported to mean "mature" needs of the Air Force; for weapons systems are created and compatible with the state-of-the-art and a production program is contemplated.

Gen. Keirn believes that the nuclear aircraft program now falls under the other category, System Development Requirements, which describes in "general terms the characteristics of a new system required for the attainment of a limited operational capability; requirements of products beyond the technical state-of-the-art.

Keirn also reiterated his charge, if he let that the present lagging position of the U.S. nuclear aircraft program is the responsibility of top Administration officials (AW Nov. 24, p. 27). He said "You will not see that there

has been a lack of interest in flight testing philosophy brought about by decisions at the Department of Defense level, but there has been no change in the technical direction of approach of the propulsion system."

Procurement Policy Review

Major review of defense procurement policy authorized in the law extending authorization (AW Feb. 6, p. 18) will be carried on a patchwork by House and Senate Armed Services Subcommittees. The Senate group, headed last week, is headed by Sen. Strom Thurmond (R-S.C.) and includes Sen. Clark (D-Calif.), Sen. Howard Cannon (D-Nev.), Sen. Everett Stevenson (R-Minn.) and Sen. Prescott Bush (R-Conn.). The House group (AW Feb. 20, p. 26) is headed by Rep. Carl Vinson (D-Ore.) who has had congressional opposition to restrictive type contracts exclusively used in aircraft and missile procurement.

GAO vs. Saltonstall

General Accounting Office is putting up formidable opposition to the proposal of Sen. Everett Stevenson (R-Minn.) to cut back basic on advanced weapons by leaving more money authority to a single panel committee and encouraging multiple type contracts. GAO and in a report to Congress.

- A single weapons panel committee could stress "a downward" position with respect to a dual source system, and the military department has such control that it becomes almost completely dependent on a particular method upon the contractor. This could seriously impact the military department's ability to discharge its basic military mission.

- Encouragement of multiple type contracts would "reduce the incentive to develop greater and more precise negotiation more difficult but we see no assurance that it could exist on a machine to contractors to be efficient in low cost production."

GAO could be "effective competition" through design, research, and development, as well as evaluation stages of weapon systems contracts. This GAO committee would do more to cut back on as well as costs, and advance the state of the art than the Saltonstall proposal.

707 to Moscow

Pan American's First Boeing 707-121 intercontinental transport has just left its 9th passenger and crew members leaving New York Moscow in 8 hr. 45 min. As compared with a previous record of 9 hr. 45 min. set 10 days earlier by the Boeing 707-121 transport aircraft (AW July 11, p. 17). The U.S. transport was originally scheduled to leave Vice President Nixon and his wife after 40 minutes of the plane in Moscow, for the official Russian visit but a last minute jump in the use of both the official and press parties forced the use of two aircraft. Since Nixon's party was the smaller—18 in compared with an original party of 100—first Mrs. John F. Kennedy was left with a refueling stop at Reykjavik, Iceland, in a 10th day Air Transport Service VC-119—aircraft, designated for the Boeing 707-121.

—Washington Staff



DUAL 425P1B hydrogen rocket engine test stand at Pratt & Whitney West Palm Beach, Fla. facility, with steam cycle system in background

Space Technology

Centaur Space Engine Components Fired in

By Everett Clark

West Palm Beach, Fla.—Hunt chambers for the first U.S. liquid hydrogen rocket engine have been firing less than a year, early spring in the rapid development of a new type powerplant that already is committed for a variety of specific military and civilian space missions. It is not known whether the complete 15,000-hp thrust engine, designated XLR 115 P-1, has been fired in the full scale version that all compo-

nents have been tested either in full or small scale firings. The XLR 115 P-1 including pump control valves, nozzles, receiver plates, etc., is being developed by Pratt & Whitney Aircraft's Florida Research and Development Center at the first of a family of powerplants that eventually will have thrusts of 500,000 lb or more. Two XLR 115 engines will power the Centaur upper stage, which will be used in the Air Force's space reconnaissance satellite launching vehicle

by National Aeronautics and Space Administration for satellites, optical probes, lunar reconnaissance, and other space missions and in Defense Department's Advanced Research Projects Agency and NASA for the Saturn space vehicle.

The importance of liquid hydrogen as a space fuel in the very near future is clearly demonstrated here by the existence of the research center with its 17 hydrogen-fueled hydrogen engine and component test stands, and the multi-ton capacity USAF Air Products Inc. liquid hydrogen production plant next door.

The four horizontal engine test stands built by Pratt & Whitney are arranged for thrusts of up to 100,000 lb. A larger vertical stand now under construction will accommodate a complete space vehicle. It is being possibly financed by the company and the government. Much higher thrust advanced models of the XLR 115 already have been designed in detail.

Two qualified XLR 115's will be used side by side in the Centaur vehicle. Hot gas ports will be oriented but allow the stage to be shorter, narrower and lighter than if a single thrust chamber were used.

Centaur Stage

Centaur stage will be 16 ft in diameter to fit the modified Centaur Atlas that will serve as a first stage. Although the Centaur stage will weigh about the same as the Vega liquid oxygen-liquid nitrogen upper stage, planned for another Atlas-launched vehicle, it has advantages of about 40% over the conventional

Thrust capacity is 336,000 lb each.

Test Program

Vega stage because of hydrogen's greater specific impulse.

The XLR 115's thrust can be increased beyond 20,000 lb using cooling built the same hardware, Pratt & Whitney says. The engine can be shut down and restarted in space. Since the engine is to be used outside the atmosphere, its make-made of stainless steel tubing and using regenerative cooling—has a very large expansion ratio, which appears to be about 48.

Extremely low temperature of liquid hydrogen (−423° F) requires that many thousands of lengths of the actuator rods used for gunfiring the XLR 115's can gas be made when the engine is very cold. One of the hindrances for regenerative cooling of the nozzle means that the nozzle actually shrinks during firing.

Although the engine is a complete flight design and not a number of testing parts, its general design and appearance are believed to be quite similar to engines using conventional propellants.

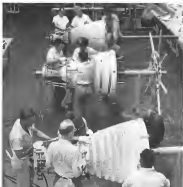
Simulated space conditions for engine testing are created by firing into a cone-vortex-divergent supersonic diffuser which is first evacuated to 0.16 in. of mercury absolute by means of a two-stage steam ejector. Steam is stored at superheated water at 250 psig and 400° F. Steam flow rate is 2,500 lb/sec at 100 psi. Ejector system is fired in bursts on the order of 10 sec. Sequence includes firing of the steam ejector, activation of the engine's electrical system which cools the main stage valves and fires the engine, cutoff of the steam ejector as soon as the chamber



TEST STANDS (below) are of open construction with sloped roof to permit quick escape of gaseous hydrogen in case of fire. No support equipment is installed overhead. Below, three XLR 115 chambers are fired of stainless steel tubing. Engine uses regenerative cooling. Extremely low temperature of liquid hydrogen even during combustion poses issues aside to drink during firing.



VACUUM CHAMBER now under construction at stand that hot stand will prevent firing of complete XLR 115 engine in simulated space conditions. Steam ejector system now used to evacuate diffuser behind nozzle will evacuate chamber.



Blue Streak Keys British Space Effort

By Cecil Browder

London—More power than it actually needs to fulfill its strategic mission is being dumped into the 4,000-ton Blue Streak ballistic missile to provide Great Britain with an adequate mobile vehicle for its entry into the space race.

Done for as much power as possible for space applications was one of the major factors behind the British Ministry of Defense decision to build upon the more powerful liquid propellants available, rather than the conventional solid fuels which would fit more readily into its plan to place the single-stage Atlas Streak on national launch capability developed in being carried out under the direction of Avco-Reno, Ltd.

The United Kingdom, a top Defense Ministry spokesman said, currently will be forced to go into space whether it wants to or not "if it is to retain its status as a major power."

To get there, Britain wants its own booster vehicle as a possible demonstration of its advanced technology for public consumption both at home and abroad. And, overall, the Ministry of Defense will take the United Kingdom's appearance as a missile power from the face of the appearance of the first Atlas Streak in the early 1950s despite the launch of 50 U.S. developed Thor intermediate range

ballistic missiles in England under joint RAF-Royal Air Force control (AW July 13, p. 28).

Under the concept laid out in the Ministry's 1957 White Paper, Britain's "Strategic missile will be gradually phased out, with the appearance of strategic missiles. This plan, Ministry spokesman said, "seems essentially the same." It does not apply to the Thor, however, since the British do not see it as a strategic missile, and it can be placed in its launchers before the appearance of the Blue Streak.

"We regard the Thor," Defense Ministry spokesman said, "as an addition to our (North Atlantic Treaty Organization) effort." It is, however, in conflict with an American wish: His contribution to the overall nuclear backing by NATO.

"The Blue Streak, on the other hand, is ours," he said. "We are more at ease with it, and we regard it as an addition to our (British) deterrent."

Blue Streak Basis

Most probably location for Blue Streak, said outside the British Isles, are in Malta, and Cyprus in the Mediterranean. From Malta, the Blue Streak could reach beyond Moscow and Leningrad and effectively reach the European Soviet missile complex. From Cyprus, it could impact on ports and trade areas around the Mediterranean and the United Kingdom, London expressed

with a nuclear capability already established in Cyprus in support of Britain's Baghdad Pact commitments and may be succeeded by the Blue Streak as the White Paper concept has been laid out.

Just how far the British will go, however, in replacing missile aircraft with missiles is still a matter of debate and wide interpretation within Defense Ministry and Royal Air Force circles. A Defense Ministry spokesman refused to comment on the timing of the White Paper, but he still contends that "it doesn't do anything that will put it in a lower class," he says, "than the other missiles which will be needed 'for a long time to come.'"

An Admiral Edward C. Huddleston, the RAF's vice chief of air staff, is more emphatic: "I submit to you," he says, "that we have a long way to go before the Blue Streak is phased out."

Within the air staff, Admiral Huddleston adds, there are no doubts at all as to a continuing place for manned vehicles. One reason the point stands out here is that the British are reluctant to overcome mechanical defense devices. Also, there is more reliable than manned vehicles.

In the air defense field, Huddleston also believes that there will be a continuing need for the manned aircraft despite the White Paper's emphasis on replacing them with missile systems. "We say," he says, "quite frankly here that it will be essential to keep manned aircraft to go up and interrogate any possible target that appears on the radar screen. A missile can't do this."

The Thor and the Blue Streak, to follow, will be under the control of the RAF Bomber Command, Britain's primary deterrent force and the only one now possessing a nuclear response delivery capability.

Previous backbones of the Bomber Command is its V bomber force of Valiant, Vulcan, and Victor and the newer Phantom. The Phantom, which has been coming into the operational force for the past year.

Although the command has begun to experiment with air-borne guiding techniques, using converted Valiants in order to increase its effective range, no new scheme is placed upon that strikes against targets in the Soviet Union and other areas, and it is a matter to have without adding. This plan the force an effective combat radius of approximately 7,000 mi.

Unlike the U.S. Strategic Air Command the command requires its force of V bombers and Thor IRBMs on the assumption that it will receive an ad-

vanced notice of at least several hours and probably up to 24 hr, from either political or military intelligence sources before an actual attack by missiles or manned aircraft.

Operating within this framework, British planners have developed proposals that the Bomber Command adopt an alert system similar to that practiced by the U.S. 16th Air Force in Spain and the Seventh Air Division in England where crews are kept on constant alert while on duty—assigned to their bases during specific periods, status changes and strong to get their aircraft into the air within 15 min after receipt of an initial warning.

Instead, the majority of the Bomber Command's total resources are conducted to the threat that a 24-hr alert of Soviet intrusions already has been received.

At this point, the alert proceeds through two stages—Alert, in which the crews get the order to report to their planes and prepare to depart from their bases, times which are known to the command, and Alert, in which groups of four aircraft each take to the air—usually in the United Kingdom and abroad.

In other tests, operating on the assumption that the warning time is too short to permit dispersal but still sufficient to permit orders to be alerted and collected together, the bombers have been put into the air as a little more than three minutes after the scramble order and some top RAF officials believe the entire V bomber force could be launched within 10 min under dispersal conditions.

They add that, even without the advance notice they anticipate, they could scramble the majority of their resources within 40 min—the warning time role upon the radar network, located within England itself to provide against a manned bomber attack from the Soviet Union at its initiation.

The Bomber Command's alert concept would be modified, however, if and when the Soviets begin to exhibit ballistic missile bases within their East European satellites or otherwise extend the range of their present short-range ballistic missile systems.

British intelligence reports Russia's present stock of IRBMs with an effective range of 650 mi., not enough to reach the United Kingdom from its bases within the Soviet Union, and believes that Russia's stock of IRBMs will be directed exclusively against the U.S. in the event of nuclear war. By moving them Britain would have been the instant a nuclear war in Europe (see a base located in a satellite country as estimated at between seven and 15 minutes).



Navy Launches Polaris AX-11

Non-rocketed AX-11 lifts off the launching pad in 10th test of a Polaris missile. The vehicle was damaged by the major stage which apparently 75 sec. later after a scheduled practice coast it to over 60 miles (see p. 21).

British May Order Military Rotodynes

London—Possible military orders for the Puma Rotodyne and the British-made for use in the main points made in a House of Commons debate on air policy.

Labour Party efforts to get government administration that policy toward the "three day" aircraft industry would establish new guidelines. Government spokesmen denied the need even for a committee of inquiry, and passed over a suggestion for a Ministry of Aeronautics.

Minister of Supply, Anthony Brown said that a further order for the Rotodyne will be placed provided there is satisfactory agreement on specifications, cost and delivery dates. Brown said he hoped a firm order for two Rotodynes would be placed on the "very near future" by British European Airways. Following up a letter of interest sent last January.

Brown said the Rotodyne is an example of government efforts to be in touch with civilian demands in order to serve the market for new British aircraft. An inadequate market-outlet for British government "laggardness" with financial aid to the industry's central problem he said.

The supply minister also said the government is considering how to place detailed design work for a purpose long range aircraft with a maximum payload of 10,000 lb.

Joint study of needs of American opposition to the European military

order, partly the result of two visits U.S. aid, and rapid British responses to conduct it by linking with European aircraft firms.

In discussion of British military, Minister of Transport, Harold Wilson, stressed introduction of British aircraft and the British government to push for air force reductions at the September meeting of International Air Transport Association. He implied that the British might withdraw from IATA if the push is on successful.

Satellite Awards

Washington—Defense Department last week announced the award of three contracts for design and development of major elements of a defense-related communications satellite designated Project Caesar (AW June 18, p. 17), April 27, p. 16; (AW May 27, p. 16).

•Radio Corp., Philadelphia, will develop and build communications package, award a \$16 million contract.

•International Telephone & Telegraph Corp., New York, N. Y., will design ground-based communications system under a \$4 million contract.

•Bellman, Inc., Melbourne, Fla., will design ground-based antenna under a \$15.5 million contract.

Symington Demands More Space Data

By Fred Esterson

Washington—President Eisenhower was sharply criticized last week for not supplying Congress with more details on policies, programs and activities of all agencies involved in the national space program in a report presented to the Senate.

Critics' report was written by the subcommittee on Governmental Organization and Space Affairs headed by Sen. Stuart Symington (D. Mo.) and introduced by Sen. Lyndon Johnson (D. Tex.), chairman of the Senate Committee on Aeronautics and Space Sciences.

Symington and the first annual report submitted to the President are essentially a rehash of what had been accomplished during the first year by the National Aeronautics and Space Administration, but the report was far more probing beyond the current year.

Congress is charged with the legislative responsibility in the space field. Symington said, and in order to carry out its responsibility, it must have a comprehensive picture of the entire space program.

Symington said his law requires that the President develop a comprehensive program of aeronautics and space activities to be submitted to the approval of the United States Congress before the subcommittee, however, indicated the contents of two space programs, one civilian (S.W. 12-3-171) and the other military, but no one could read the reports. There was also the tendency of reports within various agencies as to what constitutes a complete space program.

Comprehensive Program

The commission should be directed in order to secure the future report by Congress of the annual report required by the President. Symington said. Within the context of the report, he envisioned a comprehensive space program means a planned effort of action, present and future, designed to achieve all the objectives set forth in the declaration of policy by taking into account the needs and requirements of all civilian and military agencies engaged in space activities.

Without such a program, Symington stated, weaknesses are known and no remedies will be found, and it cannot be known what will be the effect of the program, but which will affect the successful achievement of the nation's space goals.

The report was also critical of the course of executive agencies, which it said, hinder the Congress from its carrying basic policy decisions that it is going to meet its legislative responsibility.

Activities and recommendations of both the National Space Council and the Federal Council for Science and Technology are considered confidential to the President, even though the subject matter is not classified and will not affect the national security.

Both Glavin, NASA administrator, informed the subcommittee that he had discussed with the President the possibility of having the "grading" reported by him referred to the President and that he mentioned his present position and that such information would remain confidential.

The committee report recommended, however, that all facts pertaining to the national space program which would not help a possible action should be given to the American people. This would dispel the present unexamined conclusions, the report said, and keep the people properly informed.

Recommended Solutions

Other recommendations to resolve problems which the committee can be met by administrative action within the executive branch are:

- Improvements should be made in reports to the Congress in order that more complete information will be provided regarding the space policies, programs and activities of all agencies.

- A full-time executive committee to the Space Council should be appointed and a small committee professional staff named.
- Further, Glavin testified before the subcommittee that the President had not appointed the secretary in staff which the law provides but had appointed an acting secretary who is an NASA personnel. His staff is supported by NASA and the Defense Department as required. Glavin said.

- Decisions should be made and be planned concerning the future role and program areas of responsibility of the National Research Projects Agency. Some witnesses expressed the need to maintain AFPA while others suggested additional proposals for the performance of its functions.

- The nation's space policy and interests of the military, the United States and Navy should be clarified. The existing pattern of organization and administration of space activities within the Defense Department, the report said, creates problems for the military, civilian services in the formulation of plans, programs and budgets.

- Authority and responsibility for handling transactions between NASA and the Defense Department should be given to the Civilian-Military Liaison Committee. Subsequent to the conclusion of this study, and prior to the

agent, the President approved a revised charter for the Civilian-Military Liaison Committee, to strengthen the group along the lines recommended by the space subcommittee.

- Planning and programming for research and development should be executed. Priorities and program areas should be given to important programs. Considerable testimony was given to the subcommittee in the effect that expenditure limitations on funding studies in research and development programs in the Defense Department.

- A comprehensive space program should be prepared and submitted both to a Congress and to the President.

- Some effort to avoid duplication in specific programs and operations has been made in both NASA and the Defense Department. The testimony indicated, however, that this should be a great deal more effort to coordinate activities and civilian space policies and programs.

- Space activities within the Defense Department cannot be managed effectively by changes in the organization and administration of the space program alone. Such changes will only be effective if they are an integrated part of a further modification of the services within the Defense Department.

The committee also said that the National Aeronautics and Space Act does not require amendment at this time. It has been in force for less than a year and therefore has not been fully tested, the committee reported.

German Construct Jet Research Center

Bonn—Constructing of a new German rocket research center which will cost about \$10 million has started at Witten Airport near Cologne.

Initial construction comprises two buildings for jet propulsion and dynamics and has applied for the necessary engineering model based on tests in a row of Mach 2 is planned for 1962. A vacuum resolution will be added later to boost jet speeds to Mach 2.5. This test plant will be essential construction of a turbine wind tunnel.

The new center will become the research headquarters of Deutsche Versuchsanstalt für Luftfahrt (DVL) which are numerous jet engine research facilities as well as in Witten and in Munich. Most of the Aerobics center will be devoted to the design and construction of aircraft testing program facilities and engine facilities.

A NEW CHAPTER IN AIR POWER



"Hound Dog" missile launched from the wing of a B-52C, vertically launches the air capability of SAC's Bomber fleet.



North American's Hound Dog missile powered by the Pratt & Whitney Aircraft J-58 jet engine. The J-58B Bomber is also powered by Pratt & Whitney Aircraft engines—eight J-58s.



This is just another example of Pratt & Whitney Aircraft's leadership in jet engine development, in whatever form of today.

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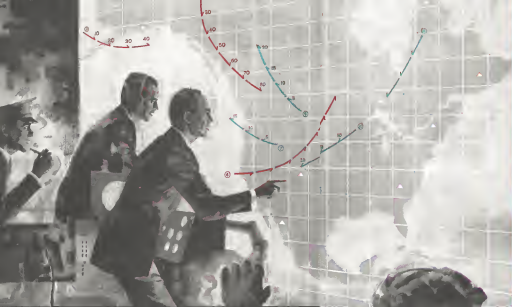
In the case of nuclear propulsion, for example, Pratt &

Whitney Aircraft has demonstrated important technical achievements which only a year ago were considered impossible or highly improbable. More accomplishments have also been made in high energy liquid propellant nuclear engines and other advanced applications of power for flight. These advances are opening the way for air-to-space warfare, as well as for vehicles of space travel.

Flight Propulsion by PRATT & WHITNEY AIRCRAFT

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• The AirResearch Pressurization and Cooling System on North American X-15s is radical departure from normal pressurization and cooling systems also powered by AirResearch which up to now have utilized outside air compressing the aircraft. When the X-15s ascend vertically climb into space beyond the earth's atmosphere, it will carry its own atmosphere in the form of liquid nitrogen dispensed through a 10-ft.

liquid AirResearch pressurization and cooling system for the pilot and vital equipment.

X-15 applications include pressurization and cooling the cockpit and the pilot's flight suit made of rubber to breathe pure oxygen, cooling and pressurizing electronic equipment and creating the maximum atmospheric, cooling the plane's own crew, and operating automatic equipment. High pressure helium gas is injected

to a flexible expansion bladder forcing nitrogen out of the storage tank, ensuring a normal flow at all times.

From the 1950s to the modern jet engine and now the X-15, AirResearch pressurization and cooling of these systems making aircraft completely the company's own and world leader in the pioneering and advanced development of pressurization and refrigeration systems for high altitude, high speed flight. Your inquiries are invited.



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Juno II vehicle carrying Explorer VI satellite payload was destroyed near Pad 5 at Cape Canaveral, Fla., at 12:35 p.m. EST July 18 after crawler failed at 11:40, causing loss of control of booster. First tank has just been registered.

Failure of Juno II Attributed to Faulty Inverter

Apparent failure of an inverter on the small first Army-Civilian Projector booster of the Juno II vehicle shorted an attempt to launch National Aeronautics and Space Administration's first Bellini-Missile Agency Explorer VI satellite payload. Inverter designed to convert 24-v. direct battery current into alternating current of a desired frequency and voltage for a vital control function failed at 11:40. Range safety officer destroyed the missile five to six seconds later. Wreckage scattered over 600 ft. Gas fire that resulted cut off 17 solid rocket and re-ignition stages and broke through an air intake into blackhouse motorcraft. Payload was thrown over 100 ft. transmitted the loss of seven seconds. Despite shock and fire damage, some components may be reused if another Juno II vehicle, shown at night on ARMA assembly shop, is mated for a test and launch attempt. Damage to Army landing pad was slight.



Juno II is mated to Army Bellini-Missile Agency ship prior to July 15 launching.



Atlas Nose Cone Recovered After Firing

Atlas intercontinental ballistic missile nose cone recoils to the nose from USAF-Corvus Atlas SC which was recovered after a firing test, a perfectly demonstrated during flight inspection at General Electric being at Cape Canaveral. The equipment at the nose of the missile is a guidance and recovery unit. Atlas SC has been named Atlas Mobile Range for the missile's first mission in its launch and first recovery of a nose cone after flight over the suborbital stage. The Atlas SC was heavily instrumented to pinpoint a first fire problem that caused failure of Atlas TC and SD and might have alerted those other flights in the last few attempts; it also made test and development.

Greater Subsystem Competition Planned in USAF Procurement

Washington — Under congressional efforts for increasing its present missile dollars on new fire from Air Force last week a Senate Armed Services Subcommittee is taking steps to break up major missile firms and stimulate competition. Under the plan, Air Force will:

- Phase design qualifications and contract awards with subsystem manufacturers.
- Make an advanced weapon a stable unit, break out standard items from the original contractor for competitive bid.

Conduct separate design competitions for major subsystems, particularly electronics.

At Fort Meade, Gen. W. J. Thornton, in charge of production and programing at the office, of the design chief of staff for nuclear and guided missiles, is to try to give the contractors the maximum possible responsibility and freedom of action consistent with overall responsibility for procurement of an efficient weapon system and management of its dollars.

Thornton will USAF expects to bid the major subsystem manufacturers on the R & D from under the direct control of Contract but the single prime contractor and contract directly with them in connection with the fiscal 1968 purchase of 16 missiles. Then, as 14 major subcontractors. An appraisal of the change is now under way. Thornton

prefers bid contracting. The "break out" portion is said to be for items such as launchers, electronic generators, better air conditioning.

In answer to congressional criticism that "the biggest sin" in missile procurement has been shifted to single prime contractors, Thornton pointed to the North American 1-108 procurement program in which USAF must build a design competition for the five missile subsystems was in Hughes Aircraft Co. and then "Airframe." North American is responsible for the Hughes rocket. It explained that the system has not involved the stage of design stability which would occur in being put through design by USAF and forwarded to the major prime contractor.

House Group Approves Nuclear Power Funds

Washington—The Appropriations Committee, the appropriations bill for activities of Atomic Energy Commission's nuclear and energy research and development, and nuclear energy project, passed last month \$1.7 million for fiscal 1969 funds requested by AEC for research nuclear propulsion.

Following are details on the committee's action:

- **Atomic nuclear propulsion.** Committee approved \$61 million of the \$65.7 million requested by AEC for fiscal 1969. With the \$75 million in the Department of Defense, the total for the fiscal 1969 for the year AEC Chairman John A. McCarroll reported to the committee that progress in this program over the last few years has appeared to be slow, and it has been expressed that the program is not progressing as fast as the original objectives. It could be achieved within a reasonable time.
- **Rocket and missile propulsion.** The bill \$17.7 million for AEC to continue the development of the use of nuclear power for rockets. Project Rover and for space nuclear power plants, was voted in the committee.
- **Thermonuclear.** The bill \$17.7 million for AEC to continue the development of the use of nuclear power for rockets. Project Rover and for space nuclear power plants, was voted in the committee.

There is a \$44 million increase over the fiscal 1969 allocation for the two programs.

• **Atomic power.** The \$121 million approved by the committee is \$46 million over AEC's fiscal 1969 budget for that program. In his testimony, McCarroll said that the program is progressing well. Two major approaches are under development. One approach is the use of a nuclear reactor, and the other is a small reactor. The central, small reactor is an active Stage III device has led to a system of the dollar value of the Western Electric Co. contract for Atomic's New York now under construction, has a million for cost

Pyle Hits FAA Budget Reduction As Hindering Recruitment Training

By Kenneth H. Davis

Los Angeles—Air traffic control equipment development program will remain on schedule, but personnel recruitment training will be hindered if the House of Representatives' reduced version of the Federal Aviation Agency appropriation bill is passed, Deputy FAA Administrator James F. Pyle told the joint session of the House Transportation Committee for Appropriations and the Senate Committee on Commerce and Transportation. Pyle said that the FAA's budget for fiscal 1969 is \$1.1 billion, a 10 percent reduction over the fiscal 1968 level.

Pyle predicted that equipment will be completed, whereas the personnel training will be delayed. He said that the FAA's budget for fiscal 1969 is \$1.1 billion, a 10 percent reduction over the fiscal 1968 level. He said that the FAA's budget for fiscal 1969 is \$1.1 billion, a 10 percent reduction over the fiscal 1968 level. He said that the FAA's budget for fiscal 1969 is \$1.1 billion, a 10 percent reduction over the fiscal 1968 level.

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the talent and experience of other agencies and organizations having contact with the civilian aviation field. The military services, Air Force, Navy, and Marine Corps, and the Coast Guard, have been invited to participate. Representatives from the organizations must have experience in the field of civilian aviation and must have the ability to act as a liaison with the FAA. All agencies have accepted the invitation.

The advisory group will be composed primarily of civilian experts. At present, the FAA's budget for fiscal 1969 is \$1.1 billion, a 10 percent reduction over the fiscal 1968 level. He said that the FAA's budget for fiscal 1969 is \$1.1 billion, a 10 percent reduction over the fiscal 1968 level.

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regard to new, under. Under an Air Force contract, Fairchild will gather data at Keesler, using Fairchild equipment that is now installed in an Air Force plane.

In the field of personnel training, the FAA's budget for fiscal 1969 is \$1.1 billion, a 10 percent reduction over the fiscal 1968 level. He said that the FAA's budget for fiscal 1969 is \$1.1 billion, a 10 percent reduction over the fiscal 1968 level. He said that the FAA's budget for fiscal 1969 is \$1.1 billion, a 10 percent reduction over the fiscal 1968 level.

News Digest

B. F. Goodrich Co. one piece space unit will be used in Moscow, space station in advanced and related space. NASA's National Aeronautics and Space Administration, also more than six months of evaluating three, available from tests, said it will order approximately 32 Goodrich units for about \$75,000. Seven NASA selection board evaluated NASA Lt. Colonel Walter M. Selman, Jr. one of the space pilots.

National Aeronautics and Space Administration and Space Technology Laboratories will launch a satellite from Cape Canaveral, Fla. into a highly elliptical orbit about the Earth, as a part of the satellite will carry a high resolution TV camera (APR 23 p. 26).

Chicago Aircraft Corp. has completed a \$200,000 contract for three B-12D reconnaissance helicopters with General Dynamics Corp. of Canada, including the company's own looking to right. Aircraft will be made in the U.S. at the plant at New Bedford, Mass. General Dynamics, Chicago president, said aircraft is now under development, is completed in September.

Ryan Aeronautical Co. will study a plan for a new, high speed, high strength material for which operation at extremely high altitudes could be Air Force contract. Three contract orders on Ryan's Aeronautical Co. of a new material, a combination of magnesium and aluminum, of high temperature resistant alloy.

Boeing 707-120 International jet transport jet will be a certified jet aircraft, which is Federal Aviation Agency. Aircraft for the program was given of 102,000 lb. per hour, as for Part 2, Whitehead 707-120 jet transport aircraft at 15,500 lb. thrust each. Boeing has orders for 47 International.

FAA May Order Radar on All Airliners

Proposed order designed to reduce weather hazards; total cost to carriers could reach \$27 million.

By L. L. Doty

Washington—Federal Aviation Agency, in a move to combat the growing number of accidents caused by severe air turbulence, took the first steps last week toward ordering all U. S. airlines to equip their fleets with airborne radar.

The action, taken in the form of a proposed rule making, would require all certificated airlines to purchase and install airborne weather radar on approximately 60% of the 2,077 transport aircraft now in operation within the next eight months. Potential cost of the conversion to air carriers, including implementation as well as scheduled airframe, could run as high as \$27 million.

Although the 350 DC-8s and the less Lockheed L-1011 Lockheed now in passenger service are excluded from the proposed regulation, FAA is giving strong consideration to issuing the order as a sweeping rule that will embrace all types of passenger-carrying transport aircraft.

According to FAA officials, the proposed regulation was prompted by three factors:

- Number of severe accidents causing structural damage and injury to passengers during high speed flights, through bad storms and violent air turbulence has been the source of concern to FAA.
- Strong possibility that the Capital Airlines accident near Baltimore on May 12 which took the life of 31 passengers (NAA May 15 p. 41) was caused by the aircraft entering extremely strong air currents has focused attention on the hazards of turbulence.
- Success of United Air Lines in virtually eliminating accidents attributable to turbulence through the widespread use of radar has demonstrated the value of radar as the safest method of flight.

Cost Estimates

Actual cost of the equipment and its installation for all air carriers will amount to \$13 million. Spares and test equipment will add another \$4 million to the overall cost. Conversion of the DC-8 is reported by certificated carriers of regional, could reach a \$7 million cost. The cost supports of which would be borne by the scheduled carrier's carrier.

Radar units are currently selling at a price ranging from \$8,000 to \$20,000 each. Installation costs vary widely according to the type of aircraft involved. For example, Lockheed L-1011 turbo-

ducted with the DC-8, and in September, 1974, Australia had 100 aircraft authorized expenditure for the purchase of the units. Contract for the radar equipment was let with RCA.

Complete cost of the program amounted to \$5 million, but United now feels that the initial investment eventually will prove to be well warranted.

The carrier estimates that it has saved approximately \$15,000 a year due to the result of radar. About \$10,000 in saved fuel costs in fuel costs and in pilot flying time is offset down on flight delays and changing under-reading detectors around thunder storm areas.

Damage to aircraft from bad air turbulence has been substantially decreased resulting in maintenance savings of about \$400,000 each year. More than \$15,000 has been saved in the carrier through the reduction in damage to its aircraft caused by in-flight damage.

Appeal Time

The proposed rule making issued by the Federal Aviation Agency allows 60 days for comments from interested parties. If the regulation is adopted as a part of the Civil Air Regulations, carriers will be granted 30 months to make and complete conversion of their fleets.

According to the FAA, there is sufficient radar equipment available to protect one airline at a time that would slow down the program.

DC-8s and Lockheed L-1011s are excluded from the regulation because of a finding. "All aircraft certified as for transport engine, rules and carrying passengers shall be equipped with airborne weather radar." Both the DC-8 and L-1011 have certified under Part 75, while all other transport aircraft have been certificated under the "transport category, rules" or Part 75 regulation. 14 CFR 121.121.

At Transport West, members will meet next month to discuss the proposed rule. Very little protest is expected, however, since a majority of the scheduled carriers already are reluctant to adopting radar as an operating necessity.

Alan de Loof, Transport Airlines will consider the rule at its quarterly regional meetings which begin tomorrow in Anchorage, Alaska. Air Line Pilots Assn. has long advocated full implementation of airborne radar on all airlines.

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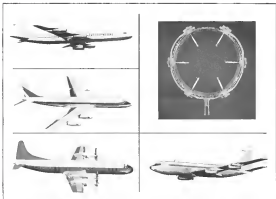
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EXTERNAL differences between the A and B models of the jetliner. The left transport, an aircraft with three windows with three slightly smaller and round above the side wing, is the Tu-104B being refueled in the background. The right transport, an aircraft with three windows with three slightly smaller and round above the side wing, is the Tu-104A. The left transport is the Tu-104B being refueled in the background. The right transport, an aircraft with three windows with three slightly smaller and round above the side wing, is the Tu-104A. The left transport is the Tu-104B being refueled in the background. The right transport, an aircraft with three windows with three slightly smaller and round above the side wing, is the Tu-104A.

Aeroflot Faces Jet Airport Problems

By Robert Hottel

Moscow—Aeroflot's expanding jet transport fleet and increasing operations are forcing major operational changes ranging from ground handling equipment through landing aids, airport terminal facilities and runway construction. Some of these jet age problems, such as air ground handling equipment designed for the speed and volume of jet operations, have been solved with a speed that surprises foreign visitors, officials resident in Moscow. But

other problems such as airport terminal and runway construction will remain as acute problems over all the portions of the country. Seven Year Plans are fulfilled by 1975.

The airports in Aeroflot's hubbing system, some from the relatively modern Vnukovo terminal outside Moscow, with a 9,000-ft outside taxi runway, GGA and ILS landing system, high sensitivity approach lights and radar traffic control, to grass fields and dirt strips with only a guide sock and a boundary fence to guide Aeroflot pilots. These

grass fields are the rule rather than the exception once a traveler departs from a jet service business. At some of these grass fields come, sharp, gusts, dusts and noise can cause without apparent consequence with the air traffic.

A lot of white ground paint is laid out on the grass to indicate the correct landing direction, and a labor stationed airport employee is posted at the bow door fence waving a white or red flag to indicate approaching pilots whether the field is clear of animal or air traffic. On a warm summer day in the Ukraine, the Caucasus or Jiang the Black Sea, these grass fields have a deep, bumpy air that takes the nature of an air traffic barrier in and out of focus with ILS, ILS and ILS equipment. The next highest class of airport has a single runway with all crosswind operations with the grass.

Passenger Wait

When the wind stress from certain directions at some of these grass fields, the Aeroflot transports come to a halt more than a half mile from the airport terminal building. Transport passengers then lounge in the shade of the, search wings while the cockpit struggles to the airport building and gets his clearance, and cargo is unloaded. Noisy cattle pens or haystacks are used as cargo, but facilities. Most Aeroflot ground ships on the grass field circuit are again held to 10 min from touch-down is ideal.

In that time we observed an average of four hours to see, other animals and departures from each field, indicating the volume of traffic that even these primitive facilities handle.

Both Soviet airline and military pilots are experts at operating large, high-

performance aircraft out of dirt and grass fields. We observed several light aircraft outside Moscow, in Chuvash as the USSR, where MiG-17s and MiG-19s were being operated from dirt runways. Aeroflot pilots exhibited skill in landing and taking off trucks from ILS-Mo lines gave fields holding the scheduled off some most forward speed was filled on landing and leaving it off the ground almost immediately after the takeoff run began. At Vnukovo, capital of the Krasnoyarsk, the single paved runway was under repair when we arrived. The Aeroflot pilot set his landing gear ILS-Mo down on the airport and took off again from the same runway with the same schedule that he used on the paved runway. It took him 10 minutes.

Dirt Runways

Krasnoyarsk, the third largest city in the USSR with a population of over a million and numerous one of the most rapid urban growth rates in the country. It is a major air traffic hub, yet it is still served by a mere grass field that leaves traffic in more into dirt grooves of heavy mud or thick dust depending upon the weather. There are plans to build a new runway airport and terminal building at Kras in the Seven Year Plan just after showing in 1975 but as yet, no one in the airport to know when construction on this project will begin.

In the meantime, this key passenger traffic center is served by 15-passenger Tu-154 passenger jet and 12-passenger ILS-Mo transport aircraft. More than a dozen An-10A jet engine for long transport also operate off the dirt field on such cargo scheduled for their final operational stage. More prior to beginning passenger service both ILS-Mo transport and Tu-104 transport transports were observed parked on the Kras dirt field, indicating that they were able to operate on it at least experimentally.

Aeroflot officials claim they will operate the 104 passenger Tu-104B soon on the Kras-Moscow and Kras-Leningrad run despite the lack of airport improvement at Kras.

Total of 90 air airports suitable for jet operations with modern passenger terminals and radar traffic control systems are scheduled for construction during the current Seven Year Plan. But even this construction program will leave us no large cities with good airports and the An-10A has been specially designed to serve this type field.

Watching the An-10A take off with several cargo loads from both the dirt field at Kras and the concrete runway at Vnukovo, it was difficult to detect much difference in their takeoff rate of climb and on landing rate with severe pitch gradients on the different



AIRPORT AT TASHKENT is a positive structure consisting of large center hall and two re-entrant wings connected by open galleries. Note surface has opened by Aeroflot to take passenger downflow. V-type tree (center) and Elm (background) (left).



CONSTRUCTION IS PROGRESSING on a new building at Vnukovo airport to house Aero-Flot offices and provide more space for luggage passengers whose volume now operates into Moscow—Aeroflot maintenance hangar is in left background.



AIRPORT PASSENGER TERMINAL at Almaty is a central hall in center line of older style Aeroflot terminal. Note rooflights mounted on roof and tower to illuminate ramp at night and tower lighting on tower in both Cyrillic and Russian alphabets.



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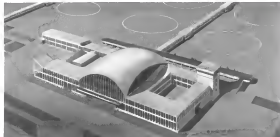
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ARTIST'S SKETCH of new airport terminal building scheduled to be built at New Mexico State University. This is typical of the new style terminals scheduled to replace older structures at major "hub-and-spoke" airports. Control tower protrudes from right corner with long overhangs providing protection from severe Russian weather for passengers in coach loading area adjacent to docks.

Russian ground radar stations en route where crew member decisions are made.

GCA type equipment also is used at airport terminals in the passenger loading and with a Russian ILS type beam landing system also available. GCA facilities in English are given foreign airport crews who reported at Vladivostok.

All Aeroflot transports are equipped with ILS type except those parked in duration with the modernization working, mostly the opposite of western type ILS. Aeroflot has purchased two west coast type ILS installations in England (AWM May 25, p. 39) for installation at Vladivostok and use for foreign airlines. The GCA equipment observed at Vladivostok and other airports appeared to be of early postwar vintage. Aeroflot officials on modern airport radar in being developed, including tapes mounted by television and modern traffic control center console displays employing a variety of color reported data. Communications are standard VHF type with single sideband equipment used in the newest jet transports, such as the Tu-104 and Tu-114.

Miscellaneous Installation
Non-deck-mounted radio beacons are the standard on most navigation facilities flying into the Moscow area both foreign airlines and Aeroflot pilots passed transmits before a complete ground-to-air approach pattern generally to avoid low clouds in conjunction of the triple belt of air defenses.

Despite this attempt at security screening, the standard approach from Vladivostok passes directly over the

of the large, three-story defense missile installations in the Moscow center missile belt. Aeroflot jet transports approach in the vicinity of fuel consumption. Be direct routes in and out that provide good visibility of both center and outer belt missile installations and the ring of fighter wings that has not far behind the missile ring.

While returning to Vladivostok on the ILS from Kiko, our pilot flew a device having approach pattern apparently dictated by security considerations rather than traffic demands, but made his final approach to Vladivostok at relatively low altitude over the edge of the bay. Red Air Force experimental flight test installations at Krasnodar.

On other Aeroflot flights the low circling approach and climb-out, their takeoff period a good view of operational fighter and jet bomber fields, anti-aircraft gun ports and defense missile batteries.

Ground Handling Equipment

Aeroflot sample equipment is visible in the new crop of ground handling equipment used for jet transport operations at Vladivostok. The typical of this new equipment has not needed much beyond the Moscow hub and a few Los Angeles international terminals such as Tashkent but it is a indication of the Aero fleet based in this field. Standard Soviet trucks have been quickly adapted to provide modern power sources for parked jets and bus loads to haul the parked jets to hangars for removal from the terminal area. New engines are stated both to reduce noise and blast effect in the passenger area and

also to conserve fuel. Both baggage and baggage transports turn back to the ramp after loading, under their own power.

The four engine baggage carts that have been designed to conserve fuel while towing in.

Hand-pushed baggage carts have been replaced by tractor towed trains of long pipe carts and a common belt baggage loader is new in service to dock the both baggage compartments of the 100-passenger Tu-104. Self-propelled at portable light stands are used in all the jet transport.

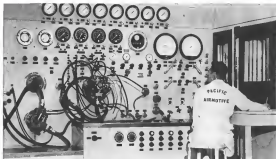
Fixed and new loading doors are used for nonstop service and passenger loading systems of the Tu-104 and Tu-114.

Modern Buses

Modern design passenger buses are now used on special service between downtown Aeroflot offices and the airports and to carry passengers from the terminal to departing aircraft. When passengers on the 39 cars. Tu-104 service complained that the low trip from Vladivostok, Soviet in Moscow to Vladivostok and from the Leningrad Airport to downtown took twice as long as the flight. Aeroflot quickly responded a rapid response bus service at both to quickly shut out the ground trip time as half.

(This is the third in a series of articles on Aeroflot, Soviet airline jet operations based on interviews with Aeroflot officials in Moscow and on a 5,000 mi trip around the Soviet Union from 1958 to 1960 and RTM's transport.)

Jet accessories ... built by Holley, distributed and serviced by PAC



Five Holley Carburetor Company jet fuel metering systems are cleared for test at Pacific Air motive Operations on pre-test engine laboratory test equipment such as the bench pictured above. Designed and built for PMA, this bench tests and calibrates jet fuel systems accessories used on engines up to 30,000 pounds thrust.

PMA's veteran jet accessory mechanics have had extensive experience on LaGuardia accessories such as the fuel restrain for the J74, compressor bleed governors for the J57 and the J73 and J74, the bleed pattern actuator for the J75, as well as many other fuel jet, water jet, gas jet accessories.



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New Night-Coach Fare Protested by National

Washington — National Airlines moved last week to block a move by Northeast Airlines to offer reduced night-coach fares on its nightly nonstop flights. That East Coast carrier's board approval of the fare would nullify the purpose of reduced night coach fares now being offered by National Eastern and Northeast on the New York-Newark route.

Requesting suspension and investigation of the Northeast fare, scheduled to become effective Aug. 1, National said the proposal flies in direct CAB policy on all peak routes, will prove unworkable for Northeast and will result in a serious traffic imbalance for all other carriers between northeast and western points. As a defense, however, the carrier noted, National and Eastern have both filed for the same fare reduction.

Much the same pattern evolved from National's filing last March of a 25% fare reduction for night coach flights on Atlantic, Pacific and Western routes. In April 1971, Eastern and Northeast filed their own defense and asked CAB to suspend and investigate National's proposal. The Board dismissed their complaints and so July all three carriers complied with the plan to include Thursday night coach flights.

Pointing out that it has been experiencing average load factors of 78% on Friday, Saturday and Sunday nights, as compared to 49-57% for other nights of the week, National said it assumes Northeast's experience with the same distribution of night coach traffic through the week. On the basis of these figures, National indicated that such weekend periods could not be represented as true all peak periods under CAB policy. Adoption of the Northeast fare would result in a reduction of northeast coach passengers back to weekday traffic on the New York route "will be played with one of the very problems which the industry has now designed to overcome."

In fact, the Board originally required that all peak fares apply only to half off-peak periods so also should the Board require that reduced all peak fares apply only to such portions of the overall off-peak period as require the application of such fares for promotional reasons," National said.

National also called attention to Northeast's original objection to the weekend fare filing on grounds that it would be unworkable. "It is most strange that a carrier, having asserted that a particular fare was unworkable on a three night basis, as case is one which the application of the same fare on a seven night basis."

COCKPIT VIEWPOINT

By Capt. R. C. Robson



A True Story

The story you are about to read is true. A few scenes and numbers have been changed to protect the innocent. It was Thursday, the 24th, I was working the morning DC-6 flight Flight 274 out of Washington. My partner was Ben Fields.

• 8:21 a.m. Flight 274 reports to the New York Center over the Columbia, N. J., intersection at 7,000 ft.

• 8:22 a.m. [to center, Flight 33, reports approaching Albion, Pa., at 24,000 ft. with a minor fuel problem and requests an expedient clearance to descend]

• 8:24 a.m. [to Flight 10 reports over Allentown. The New York Center clears Flight 10 to descend to 10,000 ft.]

• 8:25 a.m. Flight 274 reports the ability to maintain visual flight conditions in order to clear Flight 10 an uncontrolled descent.

• 8:27 a.m. [to 10 requests a direct order toward Allentown, an uncontrolled descent and immediate priority landing clearance]

• 8:31 a.m. [to 33 reports over Allentown at 9,000 ft., lets down over the field and lands without further ado around 8:41 a.m.]

Subsequent investigation disclosed that a faulty fuel quantity gauge plus the misinterpretation of a fuel warning light, had caused the cockpit confusion. The captain's only choice, a quick landing.

• 8:35 a.m. Flight 274 reports to LaGuardia Airports Control over the Glen Cove, N. Y., circuit at 5,000 ft. and is given a clearance to descend to 2,500 ft. on a south heading for a "back course" approach. (You if you remember the last LaGuardia accident involving a Lockheed Electra, you know as the "one-legged" approach. Latest LaGuardia accident reports one more accident.)

• 8:38 a.m. At Flight 274 is descending through 3,000 ft., the LaGuardia controller is heard to call "33 Papa" — requesting "Papa's" position.

• 8:40 a.m. Flight 274 is requested to climb immediately to 5,500 ft. and make a 180 deg. turn on account of traffic in your vicinity. (This is a typical occurrence when VFR traffic arrives unannounced in the middle of instrument conditions.)

• 8:45 a.m. Flight 274 is cleared for a back course approach behind 53 Papa.

• 8:46 a.m. LaGuardia approach control requests 53 Papa to report his position. Necessary.

• 8:49 a.m. A second report brings forth the information that the three-ten leader shows 53 Papa is overhead of LaGuardia ramp, and receiving "an erratic indication from the H.S. tachometer." (Flight 274, directly behind 53 Papa, has a normal indication that you must remember that everything is backwards on a back course approach—the road sign means it reversed.)

• 8:50 a.m. 53 Papa is told to climb immediately, to 11,000 ft. on a southward heading because the DC-6 (Flight 274) is also at 800 ft. approaching the LaGuardia ramp.

• 8:51 a.m. Flight 274 lands at LaGuardia. 53 Papa is returned back to another approach after instrument traffic is notified.

No criticism of 53 Papa's pilot is intended. Back course approaches, especially at places like LaGuardia, have an excuse for confusion. Were we to make this test with a real fuel problem for their uncertain hour, with Flight 274's path once would have been lost by all.

There are the facts. Aspects with 18-second latencies are hardly fit to serve multi-million dollar jet aircraft. This must be changed.

Gear Bolt Failure Led to 707 Emergency

By Gloria Carrasco

New York—The leading gear trust, heavy brass which caused the loss on a lot of two mass wheels of a Pan American World Airways Boeing 707-120 jet transport (AWM July 20 p. 14) was the list of a series of component failures on the particular leading gear involved. *Airways Week* has learned all of the troubles were caused by failure of bolts which attach a member available to the track beam and to the main landing gear strut.

When the truck was hit, it had been stuck on the bridge for some time, which is still under investigation by the Civil Aviation Authority and Federal Aviation Agency, but the crash resulted from damage to the truck being caused by its rubbing against the pedestrian street of the pier. The trailer assembly is designed to absorb the pushing motion of the pier trucks and to arrest the travel of the truck, leave opened toward the pedestrian street. The trailer assembly had a normal time on several occasions previous to the crash. The truck was involved in two of the two which and a subsequent emergency landing at Midway with its attendant crew members.

There have also been isolated instances of similar mischief problems with other Boeing 707-130 aircraft. All airlines using the plane are now checking the lenses for possible damage before each flight. One lens replacement has been made as a result of such inspection since the Pan American is about to but in this case the lens damage was considerably below what would normally be allowable.

While the Pan American incident was being investigated, the 737-120 and New York International Airport lost the front page again after an American Airlines jet reported hydraulic failure on route to the field and landed safely one week after the Pan American emergency. The resident publisher, Ed U. S. Rip, Steven B. Deaneau (R.N.Y.) is well for providing of the airplane, has Federal Aviation Agency Administrator

The American jet landing was made at 6:04 p.m., almost two hours after the pilot advised the airline by computer radio that his helicopter pressure gauges were running lower than normal. The

Port of New York Authority was all over about 4:35 p.m. of the trouble, and when the pilot reported about 4:45 min. later that the hydrostatic inflation was complete, the Port Authority decided the situation called for help from the

New York City Fire and Police Departments. The Port Authority notified those agencies and the tower, and engineers were reported to have been authorized to all concerned, in contrast to the interagency conflicts of the Port Authority. City police set up road blocks of three, eight entrances surrounding traffic to prevent a recurrence of the previous September's mob scene. A Port Authority spokesman said last week, however, that no police force could deal with a situation like that of July 13.

The American incident actually was one of 18 jet alerts at the airport that have occurred since last October. During the past year, according to Port Authority figures, there has been 3,000 alerts of both piston and jet aircraft. In each alert, Port Authority emergency personnel is dispatched to the runway.

The pit shorts have resulted from troubles with hydraulic systems, engine blowouts, oil leaks, flat tires, pump failures and other bugs, according to the agency. But most of them were not considered serious enough for Fire Department and to be squandered.

One of those alerts, incidentally, was another American Airlines jet that landed while the damaged Pan American plane was still circling the airport July 11 and burning off fuel for its landing. The American Airlines plane, also with landing problems, landed unscathed in the general confusion. The Port Authority, said by a spokesman,

In the July 15 American Airlines is subject, the gear was lowered by the normal system. Part of Boeing's "fail-safe" principle of landing systems, this involves use of a special wrench which inserts the gear doors with a few turns, unlocks the gear and allows it to fall into landing position. A few more turns of the wrench lock the gear doors

There are two backup feeding systems in addition to the thrust vector control system.

Assessment is still being to run down a general problem with the hydraulic system of its jets. According to the source, the problem is that of excessive pressure buildup which causes some part of the system, such as a seal or

Quetzada, who dismissed the American and Pan American nationalists as a religion to Rap. Devourment last week, and the American Indians: Father: "Has been localized to temporary satisfaction of a localistic and since then

reflect adversely on the aircraft's
driver.

The FAA staff asked Donoman what the 787's intrinsic design reflects with defects in hydraulic failures to the critics of a measure rather than a necessary safety problem? Donoman said the Funcher incident was a structural failure, traceable to a series of mechanical difficulties immediately preceding the failure. "FAA had to evaluate the certification process used on the 787's landing gear," Donoman reported, "with nothing to date has been issued to indicate that the design and fabrication of Boeing 787 landing gear is deficient."

Slick Airways Orders Electra and Hawk

Washington—Shel. Amers' orders for an Lockheed Electron and six Lockheed Super Hercules turboprop as freighters highlighted evidence filed in the cargo carrier last week in the Dominican Cargo Mail Service Case.

Asking the Civil Aeronautics Board for permanent cargo and mail certification and subsidy eligibility, Slack and his experts to obtain common carrier freight operations by early next year and plans to have the Elkhart in service in 1961 and the Super Hercules operating in the middle of 1962. Slack recommended service on February, 1958.

Resulting domestic cargo must run with a fleet of eight Douglas DC-6s, which will leave the company with a net loss of \$997,000 for the year, based on an expected average load factor of 70% and a yield of 18 cents per service ton-mile. Shink estimates that application of the 10.75% rate of return on investment, recommended for the Big Four carriers by a CAB committee in the General Passenger Fare Case, would result in \$1,900,000 in subsidy payments for Slack in 1960.

Use of Florida in the second phase of its acquisition of operations would yield the cargo line a net profit of \$703,000, on a 78% load factor and average daily utilization rate of 7.1 hr, but would still require subsidy, totaling \$1,045,000 because of the increased investment of \$16 million for new equipment.

Shel said it signed letters of intent on Feb. 15 for the purchase of both Electric and Super Harco, with a proviso on the Electric agreement that purchase depends on leasing the strength to other operators by the end of 1962. Company spokesmen said a leasing arrangement is already firm, but declined to identify the operator.

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AIRLINE OBSERVER

►United Air Lines' two Douglas DC-8s are being down in Denver for crew training as flying them at their speed capabilities. It is well known primarily of added wing area at tips, more fuel and installation of various equipment at strategic points at the wing. Meanwhile, United also has pulled some seats from the aircraft to extend training time before scheduling stages.

►Three South American carriers have pooled their equipment to permit the operation of a nonstop service between Rio de Janeiro and Sao Paulo. The carriers—Varig, VASP and Cruzeiro do Sul—operate flights between the two cities every half-hour. If the plane is filled or is unseated, passengers wait a half-hour for the next flight.

►Watch for an expansion of mid-flight refueling procedures on long-range flights. Plan now scheduled by Continental Airlines (AW June 13, p. 18). Western Air Lines will adopt a similar system on some of its Lockheed Electra flights.

►American Airlines' conversion of 39 Douglas DC-8s to all-cargo aircraft will be an interim measure. The planes will be replaced by turbine-powered aircraft when "suitable" planes are available. Here is what American wants in an all-cargo airplane, according to the company's vice president/equipment manager William Littlewood: turboprop power with direct operating costs no higher than four cents per mile and continuous climb capability at a maximum cruising speed of 500 mph. Weight should be in the 40-50,000 lb. and 100,000-lb. ranges. Mechanical loading systems should be designed to be integral part of the aircraft.

►Move to keep about lower fares on transatlantic routes is gaining momentum in Britain (see p. 17). One group of British airlines leaders is advocating an immediate reduction of present air fares by one half, adding that one-way passenger fares could be cut to \$35 within 10 years.

►Volume of seats available and rates offered by the domestic transatlantic industry in June continued to climb at a faster clip than the total of first-class available seat miles. During the month, seats available seat miles represented about 41% of the total \$48 billion available seat miles offered by the 12 transatlantic.

►Chances are now strong that the International Air Transport Association Conference which began Sept. 14 in Honolulu will not approve the new fares, the IATA general meeting continues in Tokyo Oct. 12 because of the number of highly cost-conscious third and fourth class fares being the cost factor (AW July 30, p. 47).

►Continental Airlines will show a revenue passenger mile gain of 26 cents in 1975. In July over the nine months of last year. Argued traffic increases are expected to be over one quadrupled with the introduction of Chicago-Kansas City-Denver-Los Angeles (subject service on Aug. 15). The airline showed a 4.6% gain in revenue passenger miles in June over the previous June. Third Boeing 707 freight transport has been delivered, and the fourth and final aircraft of the current order is slated for delivery next month. Utilization rate on the Boeing 707 is running at 31 hr. 30 min.

►McDonnell Douglas has purchased four new Convair 440 transports from the General Division of General Dynamics Corp. First of the new planes will go into scheduled service about Aug. 15.

►Federal Aviation Agency has purchased seven new conversion seats to bring to 54 the number of seats purchased for certification in control towers and air route traffic control centers.

►Contracts totaling \$1.6 million have been let by Federal Aviation Agency for research on air traffic. Companies winning contracts are Applied Psychology Corp., General Precision Laboratories, Airborne Instruments Laboratory, J. W. Lockett, Inc., Lark Inc., Airco Research Corp., Systems Development Corp., Benco Corp. of America, Shoenberg-Cashon and Cornell Aeronautical Laboratory.

SHORTLINES

►American Airlines reports net earnings of \$9,101,000 for the second quarter compared with \$5,547,000 for the same period in 1974. Total revenues for the three months rose 13% over last year to \$97,491,000. First-half net earnings after taxes amounted to \$6,827,000, bringing per share earnings to \$1.07. Passenger 13 were served for the first half of 1975. American flew a total of 2,115,501,000 revenue passenger miles, a 7% increase and 40,091,000 freight ton-miles, a 7% gain during the first half.

►Chicago Helicopter Airways carried 28,182 passengers during June, a 32% increase over June, 1974. Load factor for June rose 66% compared with 74% in a comparable period last year.

►City of Genoa, Italy, has approved an added expense of \$5 million to initiate the start-up of the city's new airport now under construction. The cost represents a 1.9% increase.

►Civil Aeronautics Board may be closed after Aug. 2 by some of the Chicago-Dallas 2 followed by the present discussion member listed on board reference sheets. The exchange (X) between 3-3111 may still be used.

►International Air Transport Association reports member airlines carried a total of 63,249,000 passengers during 1974, a 1.3% increase over 1973. Cargo tonnage rose 71,500 and mail traffic rose 10.1% over last year.

►McDonnell Douglas carried 51,808 passengers, 9,840,000 revenue passenger miles in June, compared with 50,1 and 12,315 respectively over the previous June. The load factor had its last high day on June 10 when it carried 2,743 passengers in its routes.

►REAL and TSA/Transcontinental S. A. will demonstrate their combined intermodal effective Sept. 4 and each carrier will concentrate on developing the flow of traffic through its respective U.S. gateway. Normal relations between the two airlines will continue through International Air Transport Association type interline agreement.

►Western Air Lines board of directors has declared a regular cash dividend of 20 cents per share, payable on Aug. 14, 1975 to shareholders of record on Aug. 3. At the directors' meeting, the board also told the airline's June operating revenues were an estimated \$5.5 million and that the carrier had expended \$4.1 million to acquire passenger seats during the month.

AT THE TAPCO GROUP

Development
and production of fuel
systems and components

